



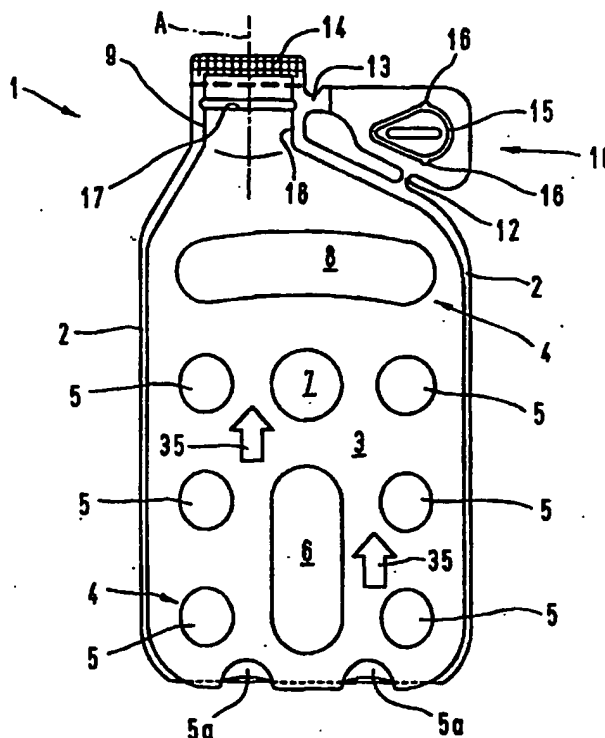
## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification <sup>6</sup> : <b>B65D 11/04</b>	<b>A2</b>	(11) International Publication Number: <b>WO 96/01212</b> (43) International Publication Date: 18 January 1996 (18.01.96)
<p>(21) International Application Number: PCT/IB95/00538</p> <p>(22) International Filing Date: 5 July 1995 (05.07.95)</p> <p>(30) Priority Data: MO94A000100 5 July 1994 (05.07.94) IT</p> <p>(71) Applicant (for all designated States except US): UNIFILL S.P.A. [IT/TT]; Via Viazza, 82, I-41030 S. Prospero (IT).</p> <p>(72) Inventors; and (75) Inventors/Applicants (for US only): TABARONI, Roberto [IT/TT]; Via Nicolò dell'Arca, 43, I-40129 Bologna (IT). BARTOLI, Andrea [IT/TT]; Via Victor Hugo, 23 - Fraz. Canali, I-42100 Reggio Emilia (IT).</p> <p>(74) Agent: LUPPI, Luigi; Gardipatent, Via Giardini, 605, I-41100 Modena (IT).</p>	<p>(81) Designated States: AM, AT, AU, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LT, LU, LV, MD, MG, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TT, UA, UG, US, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG), ARIPO patent (KE, MW, SD, SZ, UG).</p> <p>Published Without international search report and to be republished upon receipt of that report.</p>	

(54) Title: CONTAINER OF THERMOFORMABLE MATERIAL WITH A CLOSURE

## (57) Abstract

A blow-moulded container comprises a top portion, a base portion, and an annular intermediate portion interconnecting the top (9) and base portions, the top portion including a pouring neck (9) which is disposed to one side of a longitudinal axis (A) of the intermediate portion, and a closure (10) mounted at the opposite side of the axis (A) and for closing the neck (9); the mounting of the closure (10) includes a substantially planar sheet material tie (13) which connects the closure (10) to the neck (9), and a readily frangible substantially planar sheet material tie (12) by way of which the closure (10) is connected to the intermediate portion; the neck (9) is of pear-shaped internal cross section, with the apex of the pear shape pointing towards that opposite side, the closure (10) including an annular sealing surface of a pear shape to close the neck (9) sealingly.



BEST AVAILABLE COPY

**FOR THE PURPOSES OF INFORMATION ONLY**

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AT	Austria	GB	United Kingdom	MR	Mauritania
AU	Australia	GE	Georgia	MW	Malawi
BB	Barbados	GN	Guinea	NE	Niger
BE	Belgium	GR	Greece	NL	Netherlands
BF	Burkina Faso	HU	Hungary	NO	Norway
BG	Bulgaria	IE	Ireland	NZ	New Zealand
BJ	Benin	IT	Italy	PL	Poland
BR	Brazil	JP	Japan	PT	Portugal
BY	Belarus	KE	Kenya	RO	Romania
CA	Canada	KG	Kyrgyzstan	RU	Russian Federation
CF	Central African Republic	KP	Democratic People's Republic of Korea	SD	Sudan
CG	Congo	KR	Republic of Korea	SE	Sweden
CH	Switzerland	KZ	Kazakhstan	SI	Slovenia
CI	Côte d'Ivoire	LI	Liechtenstein	SK	Slovakia
CM	Cameroon	LK	Sri Lanka	SN	Senegal
CN	China	LU	Luxembourg	TD	Chad
CS	Czechoslovakia	LV	Latvia	TG	Togo
CZ	Czech Republic	MC	Monaco	TJ	Tajikistan
DE	Germany	MD	Republic of Moldova	TT	Trinidad and Tobago
DK	Denmark	MG	Madagascar	UA	Ukraine
ES	Spain	ML	Mali	US	United States of America
FI	Finland	MN	Mongolia	UZ	Uzbekistan
FR	France			VN	Viet Nam
GA	Gabon				

**CONTAINER OF THERMOFORMABLE MATERIAL WITH A CLOSURE**

The invention concerns a container, a method and apparatus for producing the container, and a method of cleaning the container.

The prior art involves disposable containers of thermoformable and heat-weldable material, particularly for liquids, comprising a pair of halves having opposing concavities, joined together at a peripheral weld, the halves defining a top portion of the container that may be opened by cutting and which has a part with a smaller cross-section constituting a neck for pouring.

Such containers are not easy to handle when pouring as they tend to cause the product to be discharged in irregular surges rather than in a more desirable continuous flow, this frequently causing uncontrolled spillage of the liquid and, consequently, undesirable wastage of the product.

Moreover, some containers cannot be closed after opening and, therefore, once they have been opened, the product contained in them, if liquid, tends to evaporate so causing further wastage.

It has also been found that, in the case of milk, which is a product that is particularly suited to being packaged using the disposable containers as described above, a further inconvenience arises consisting in its tendency to absorb the aromas of foods stored in the environment in which the open containers are kept, in particular the refrigerator, thereby causing an unacceptable deterioration in the taste of the beverage.

There is also the risk of the product being contaminated by external agents, such as dust or particles present in the environment and, sometimes, even insects, particularly in the case of beverages that contain a certain amount of sugars, thereby causing an unacceptable reduction in the hygiene of the product.

International patent application publication No. WO 94/08852 discloses a system for blow-moulding containers from a pair of webs of thermoformable and heat-weldable material including a preheating station for preheating sheets, a heating, forming and welding station for welding the webs and commencing forming of the containers and a final forming and shape-stabilizing station.

Mould halves at the heating, forming and welding station are formed with moulding channels whereby forming fluid introduced between the heated webs forms conduits between the sheets.

The top portions of the containers include centrally arranged pouring spouts which are co-axial with the intermediate portions of the

containers. To one side of the pouring spout and in the welding plane of the container is a wing formed integrally with the peripheral welding flange of the container. A closure in the form of a plug has a sealing surface to seal against the internal surface of the spout. Those surfaces may take the shape of truncated cones with oval bases. With the container in its sealed condition, the plug is a press-fit in a hole in the wing. The plug can be a separate component, or integral with the container and removable from it along a predetermined fracture line. Alternatively, the plug may be connected to the wing by means of a cord wound in a spiral around the plug with the container in its sealed condition. The plug is integral with the container and fixed to the container; the cord is obtained by punching or incision in a continuous or broken spiral. The closure may take the form of a cap.

Such prior art may be subject to considerable improvements with a view to eliminating its drawbacks.

One of the aims of the present invention is to provide a disposable container which enables the product contained in it to be poured out in a continuous and regular stream, making the pouring easier, whilst maintaining discharge cross-sections of limited dimensions, and whilst enabling easy closing of the pouring opening.

A further aim of the invention is to provide a container, particularly for liquids, in which hygiene is considerably improved when conserving the product after the container has been opened, preventing contamination of the product that may compromise its condition or organoleptic qualities.

A further aim is that of inventing a container which is stiffer and which is easier to handle.

According to a first aspect of the invention, there is provided a container, comprising a top portion, a base portion, and an annular intermediate portion interconnecting said top portion and said base portion, said top portion including a pouring neck at least a major part of which is disposed to one side of a longitudinal axis of said intermediate portion, and mounting means at least a major part of which is disposed to the opposite side of said axis and which mounts a closure for closing said neck.

Owing to this aspect of the invention, the volume available at the top of the container is used more efficiently, enabling a closure to be included in the container as sold, particularly in the case of a relatively narrow container, or enabling a relatively wide pouring neck to be provided even when a closure is arranged beside it.

Another advantage is that if a sheet material tie extends from the neck

to the closure, the tie can be made relatively longer and thus be more readily flexed, while retaining its tensile strength. In addition to the tie linking the closure to the neck, it may be advisable to provide additionally one or more frangible ties between the closure and the remainder of the container to anchor the closure during transport of the container and yet to allow fitting of the closure to the neck following opening of the container.

According to a second aspect of the present invention, there is provided a container including a wall formed with a pear-shaped opening, and a closure insertable into said opening for closing the same, said closure including an annular sealing surface of a pear shape to close said opening sealingly.

Owing to this aspect of the invention, the pear shape of the opening allows liquid to flow from the container through the larger-width, lower, part of the opening during pouring, while air enters the container through the narrower-width, upper, part of the opening; moreover, the pear shape of the sealing surface of the closure enables it to be introduced easily and reliably into the opening, through the mutual wedge action of the pear shapes. This is particularly advantageous where the pear-shaped opening has been formed by consumers cutting through a pear-section neck of the container, since such cutting by consumers inevitably produces a variety of opening formations.

According to a third aspect of the present invention, there is provided a container moulded from plastics sheet material and comprised of a top portion, a base portion and an annular intermediate portion interconnecting said top portion and said base portion, said intermediate portion being comprised of stiffening corrugations obliquely inclined to the horizontal.

According to a fourth aspect of the present invention, there is provided apparatus for moulding a container from plastics sheet material, comprising a mould having a recess having a first wall portion, a second wall portion and a third wall portion intermediate said first wall portion and said second wall portion, to shape a top portion, a base portion and an intermediate portion, respectively, of said container, said third wall portion being comprised of corrugations obliquely inclined to a plane tangential to those parts of said second wall portion further from said third wall portion.

Owing to these aspects of the invention it is possible to provide a container which is capable of sustaining both considerable vertical forces and significant horizontal forces.

Nevertheless, the base portion of the container can advantageously include approximately vertical corrugations, preferably branching from at least one of the corrugations of the intermediate portion, in order to facilitate flow of the plastics sheet material towards the very bottom of the container, which flow could otherwise be seriously obstructed by the corrugations in the third wall portion of the recess during moulding. This feature is especially advantageous for containers of relatively large capacity.

The corrugations in the intermediate portions preferably become shallower as they approach a separation plane of the mould, in order to facilitate separation of the mould dies from the container following moulding.

According to a fifth aspect of the present invention, there is provided a container moulded from plastics sheet material and comprised of a top portion, a base portion and an annular intermediate portion interconnecting said top portion and said base portion, said intermediate portion including protrusions in the form of islands distributed over said intermediate portion and serving to stiffen said intermediate portion.

According to a sixth aspect of the present invention, there is provided a method of cleaning a container moulded from plastics sheet material and comprised of a top portion, a base portion and an annular intermediate portion interconnecting said top portion and said base portion, said intermediate portion including protrusions in the form of islands distributed over said intermediate portion and serving to stiffen said intermediate portion, said method comprising injecting downwardly through said top portion a gaseous cleaning fluid, said fluid travelling down to said base portion, and thereupon returning to said top portion via substantially rectilinear routes among said islands.

Owing to these aspects of the invention it is possible not only to stiffen said intermediate portion but also to facilitate a flow of gaseous cleaning fluid, especially gaseous sterilizing fluid, for example steam, upwardly from bottom to top of the interior of the container, when the fluid has been injected into the container downwardly at its top portion.

According to a seventh aspect of the present invention, there is provided a method of producing a container, comprising heating a plastics web to a temperature at which said web is formable, moulding a larger part of said plastics web to form a body portion for said container and a smaller part of said web to form a closure for said container, said moulding of said larger part being performed within larger internal surface portions of a mould and the moulding of

said smaller part being performed within smaller internal surface portions of said mould at least one of which is displaced relatively to substantially all of the other internal surface portions of the mould during the moulding of said closure.

According to an eighth aspect of the present invention, there is provided apparatus for use in producing a container, comprising heating and moulding means for heating a plastics web to a temperature at which said web is formable and moulding a larger part of said plastics web to form a body portion for said container and a smaller part of said web to form a closure for said container, said heating and moulding means comprising a mould having larger internal surface portions for moulding said larger part and smaller internal surface portions for moulding said smaller part, first driving means which serves to displace at least one of said larger internal surface portions, and second driving means which serves to displace at least one of said smaller surface portions relatively to substantially all of the other internal surface portions of the mould.

Owing to these aspects of the invention, it is possible not only to mould the body portion of said container directly by differential pressure of fluid but also to form the closure directly by mechanical pressure produced by differential pressure of fluid.

The closure can be formed and the mould can heat the web at substantially the same time.

In a preferred embodiment of the container, it is of thermoformable and heat weldable material and comprises a pair of halves having opposing concavities, joined together at a peripheral weld, the halves defining a top portion of the container that may be opened by cutting and which has a part with a smaller cross-section constituting a neck for pouring, the neck having a longitudinal axis positioned close to one of the sides of the container, the transverse cross-section of the neck being in the shape of a pear, with the apex preferably pointing towards the opposite side of the container.

An advantage of this embodiment lies in the regularity of the outflow of the liquid achieved with the special pear-shaped section of the neck, made even more advantageous by its positioning that enables the outflow of the liquid from an area of the container close to one of its sides whilst at the same time allowing air into the container.

In a particularly advantageous variant, associated with the neck of the container there is a closure for the outlet opening, said closure forming an integral part of the container obtained during the forming process of the container and positioned in its top portion on the side

opposite to that containing the neck.

This gives the further advantage of improving the hygiene of the container, of simplifying its manufacture and optimising the material used by reducing the amount of material wasted.

In a further advantageous version, the container has, on the surfaces of the halves that make up the body of the container, a formation of stiffening and gripping elements made up of imprints or protuberances distributed over the greater part of the extent of the said surfaces.

The stiffness of the container, already improved by its peripheral weld, is thereby increased, so making it easier to hold.

In a further advantageous version the closure is attached to the peripheral weld by means of connecting elements: a first connecting element, which may be easily broken, being positioned on an upwardly directed part of the peripheral weld of the top portion of the container, a second, flexible, connecting element being positioned on the neck.

This gives the further advantage of making it possible to position the closure accurately, it being connected to the body of the container at at least two points, whilst at the same time making the closure easy to use by breaking the said first connecting element.

In a further advantageous version the closure and the said neck are provided with insertion and sealing devices, co-operating with each other for the snap-insertion and retaining of the closure.

This enables losses by evaporation to be limited and improves the hygiene of the container once it has been opened.

In a further advantageous version the insertion devices consist of at least a pair of appendages, substantially radial, that may be engaged in a corresponding peripheral groove.

This gives the further advantage of reducing to a minimum the effort required to close and open the container whilst ensuring its effective closure.

In order that the invention may be clearly understood and readily carried into effect, reference will now be made, by way of example to the drawings attached in which:-

Figure 1 is a lateral elevation of a blow-moulded container for liquid;

Figure 2 is the top view of Figure 1;

Figure 3 is a partial and enlarged vertical section in the forming plane of the area of the neck of the container;

Figure 4 is section IV-IV of Figure 3;

Figure 5 is a section as in Figure 3, but showing a variant of the cap for closing the container;

Figure 6 is section VI-VI of Figure 5;



Figure 7 is a view of the container as in Figure 1, but showing a version with stiffening corrugations provided in its lateral walls;

Figure 8 is a side view of Figure 7;

Figure 9 is a top view of Figure 7;

Figure 10 is a section through a mould for use in producing the container of Figures 7-9;

Figure 11 is section XI-XI of Figure 7;

Figure 12 is a view similar to Figure 3 but showing a variation;

Figure 13 is fragmentary lateral elevation showing a modification of the container of Figures 1 and 2;

Figure 14 is a diagrammatic section through a mould employed in manufacturing a container according to Figure 12; and

Figure 15 is a fragmentary section through the mould and container of Figure 14, but in a plane parallel to the section plane of Figure 14 and showing the mould closed.

Referring to the drawings, the container 1 is obtained by blow-moulding, for example, in a forming apparatus as described in International Patent Application Publication WO94/08852, from a pair of sheets of thermoformable and heat-weldable material, connected to each other in a welding plane by means of a peripheral weld 2, or even from a single folded sheet, provided with an analogous peripheral weld.

The peripheral weld 2 joins together the halves 3 constituting the body of the container 1: the halves 3 are preferably provided with a formation of stiffening and gripping elements 4 made up of recesses in the outside surface of each half and/or even bulges on that surface. These recesses and/or bulges naturally result in corresponding bulges and/or recesses in the inside surface.

The distribution of the said elements 4 over each said surface is preferably symmetrical with respect to a vertical centreline of each lateral surface of the container in order to achieve a uniform stiffness.

Furthermore, the halves 3 can be provided with formations of stiffening and gripping elements 4 which are either the same on both sides or different from one side to another, so that, respectively, the orientation in which the user holds the container is either indifferent or preferential.

The distribution of the elements 4 is preferably determined as a function of the position of the fingers when holding the container.

In a particularly advantageous version, shown in Figure 1, the formation of stiffening and gripping elements 4, the same for both halves 3, comprises a pair of sets of three circular recesses 5,

between which is positioned an elongate recess 6 with above it another circular recess 7 and an upper elongate recess 8, arched upwards: the recess 6 can be as large as is required to apply a label to it.

In the area of the join between the lateral walls of the container 1 and its base, there can be a pair of stiffening elements 5a, for example, having a curved outline, set partly in the lateral wall and partly in the base.

The top portion of the container has a neck 9, for pouring, having an axis A offset towards one of the sides of the container 1 and, on the opposite side from the neck, a closure 10 for the opening 11 (Figure 3) of the container 1 after it has been opened.

It is to be noted that the axis A can be inclined with respect to the adjacent side of the container 1, preferably upwardly outwards from it. Whatever the angle of inclination of the axis A, the mid-point of the pouring edge resulting, from the removal of the top stretch 14 of the weld 2, is substantially tangential to the extension 14b of the stretch 14a of weld 2 joining the neck 9 and the opposite side of the container 1, as shown in Figure 3 in the particular case of a vertical axis.

The closure 10 is obtained during the blow-moulding of the container 1, and, as such, is made from the same sheets of thermoformable and heat-weldable material that the halves 3 of the container 1 are made of.

The weld 2 extends continuously around the container 1 and its top stretch 14 is formed after the rest of the weld 2, in particular after the product to be poured has been placed in the container 1.

On use, the top stretch 14 is removed, for example by cutting or tearing, from the weld 2; the closure 10 is then detached at its first connecting element 12 and the body 15, advantageously tapered, of the said closure is subsequently inserted in the opening 11 of the container 1.

The plan view profile of the body 15 of the closure 10 has a shape corresponding to that of the cross-section of the opening 11 of the container 1, the said section preferably being in the shape of a pear to improve outflow of the liquid whilst, at the same time, allowing air to enter into the container 1.

It is to be noted that the first connecting element 12 has to be made so that it is much weaker than the second connecting element 13 so that the element 12 may be broken easily, for example by tearing; the second connecting element 13, on the other hand, has to be relatively strong and flexible to enable the closure 10 to be turned when

inserting it into the opening 11.

The closure 10 may be provided with retaining means for retaining the body 15 in the opening 11, the retaining means comprising a pair of opposing projections 16 receivable in a groove 17 correspondingly provided in the internal surface 18 of the neck 9.

Alternatively, as shown in Figures 5 and 6, the retaining means can consist of a groove 19 in the body 15, to co-operate with a pair of corresponding protuberances 20 extending from the inside surface 18. The depth of the groove 17 or 19 and the height of the corresponding protuberances 16 or 20 with which it co-operates is such as to permit the correct positioning of the body 15 in the neck 9 and to resist the elastic force of the second connecting element 13 connecting the closure 10 to the weld 2.

In the version of container 1 shown in Figures 7-11, a formation of transverse grooves 21 is set into the external surfaces of the halves 3 and thereby provides stiffening corrugations in the intermediate portions of the halves 3: each groove having a central stretch 22, substantially horizontal, such as slightly inclined upwards towards the neck 9, the said central stretch extending into a pair of straight or slightly curved end stretches 23, inclined away from each other with respect to the said central stretch 22: the end stretches 23, as they approach the weld 2, beginning to turn oppositely as indicated at 24. The grooves 21 are symmetrical about the plane of the weld 2.

It is to be noted that the formation obtained with a number of superimposed grooves 21 stiffens the container 1 against radial stresses, i.e. those that arise when it is gripped, and against axial stresses, which is advantageous for the purposes of stacking.

The central stretches 22 of the grooves 21 can be interrupted by a central, flat area 25 where printing or a label can be applied.

The pair of transverse grooves 21 closest to the base of the container 1 in each half 3 is advantageously joined with a pair of substantially vertical grooves 26 to further stiffen the base.

The mould 30 shown in Figure 10 comprises two major parts 31 serving to shape the top portion and the intermediate portion of the container 1 and two minor parts 32 serving to shape the base portion of the container 1, the two parts 31 being displaceable towards and away from each other as indicated by the arrows Z in Figure 10, and the parts 32 being displaceable not only towards and away from each other as indicated by the arrows Y, but also towards and away from the parts 31 as indicated by the arrows W. It will be understood that the walls of the mould recess 33 are formed with ribs 34 for forming

the grooves 21 (and 26). The ribs 34 extend obliquely relative to a plane T tangential to those surface portions of the recess 33 furthest from the parts 31. As the ribs 34 approach the separation plane P of the mould 30 they shallow gradually so that the grooves 22 (and 26) also shallow gradually as they approach the weld plane, so discouraging retention of the moulded container in the mould 30 after its shape-stabilization.

It is sometimes required to clean, in particular to sterilise, the whole of the internal surface of these stiffened containers prior to filling, by injecting vertically downwardly through the as yet unsealed neck 9 a gaseous sterilising fluid, for example steam. The steam is injected with the intention that when the jet of steam reaches the bottom of the interior it returns to the top of the interior by flowing upwardly while in substantially direct contact with the internal surface of the annular intermediate portion of the container 1 (see the arrows V in Figure 14). The version of Figures 1-6 is particularly advantageous in that respect because, among the six vertical columns of stiffening elements 5, 6 and 7, there are vertically upward routes 35 in Figure 1, via which routes the steam can more readily return to the top portion of the container.

As shown in Figure 12, instead of the body 15 being throughout of a downwardly tapering form, it can be of a form more like a barrel in cross-section whereby, on press-fitting of the body 15 into the neck 9, the outer end of the neck tends to engage behind the body 15 to retain the body in the neck. This version dispenses with the retaining means in the forms of the protuberances 16 and 20 and the grooves 17 and 19 of Figures 1 to 6.

Figure 13 shows that the connecting element 13 in particular can be relatively long in order to make manipulation of the closure 10 much easier.

Referring to Figures 14 and 15, Figure 15 in particular illustrates an advantageous manner of producing the body 15 of Figure 12, wherein the body is relatively stiff through being a double thickness of the sheet material. Included in one of the mould parts 31 is a single-acting spring-return, piston-and-cylinder device 36, 37, whereof piston 36 is fixed to a plunger 38. The plunger 38 has a head of a shape corresponding to that of the body 15 to be produced and, upon supply of compressed air via a duct 39 to the cylinder 37 is forced into a correspondingly shaped recess 40 in the opposite part 31. Air exhaust vents 41 extend from the recess 40. As the plunger 38 is advanced into the recess 40 it presses into the recess 40 those portions of the

two plastics webs 42 which cover that recess 40, the two webs having immediately previously been heated to their softening temperature in the mould 30. Formed through the piston 36 is a bore 43 whereby compressed air entering the duct 39 can enter the cylinder chamber containing the spring 44. A duct 45 extends through the wall of the cylinder 37 to a chamber 46 containing the head of the plunger and formed in the active face of the part 31 containing the device 36,37. Thereby, when non-heated compressed air is supplied to the duct 39 to drive plunger 38 forward, a proportion thereof reaches the chamber 46 and flows around the head of the plunger 38 to cool the head and the web material being displaced, thereby to prevent the shaped body 15 from returning with the plunger.

12  
CLAIMS

1. A container, comprising a top portion, a base portion, and an annular intermediate portion interconnecting said top portion and said base portion, said top portion including a pouring neck (9) at least a major part of which is disposed to one side of a longitudinal axis (A) of said intermediate portion, and mounting means (10, 12, 13) at least a major part of which is disposed to the opposite side of said axis (A) and which mounts a closure (15) for closing said neck (9).
2. A container according to claim 1, wherein said mounting means (10, 12, 13) includes a substantially planar sheet material tie (13) which connects said closure (15) to said neck (9).
3. A container according to claim 2, wherein said mounting means (10, 12, 13) includes a second, substantially planar sheet material tie (12) by way of which said closure (15) is connected to said intermediate portion and which is readily frangible.
4. A container according to any preceding claim, wherein said neck (9) is of a substantially constant cross-section and said closure (15) is of a cross-section substantially continuously tapering towards a free end thereof for insertion into said neck (9).
5. A container according to any one of claims 1 to 3, wherein said closure (15) is of substantially barrel-shaped cross-section for insertion into said neck (9).
6. A container according to any preceding claim, wherein said neck (9) is of pear-shaped internal cross-section, with the apex of the pear shape pointing towards said opposite side.
7. A container according to claim 6, said closure (15) including an annular sealing surface of a pear shape to close said neck (9) sealingly.
8. A container according to any preceding claim, wherein said intermediate portion is comprised of stiffening corrugations (21) obliquely inclined to the horizontal.
9. A container according to claim 8, wherein said stiffening

## 13

corrugations (21) comprise respective central stretches (22) which are substantially horizontal.

10. A container according to claim 9, wherein each of said stiffening corrugations (21) includes opposite end stretches (23) which are directed oppositely away from each other.

11. A container according to claim 10, wherein said end stretches (23) of each corrugation (21) include respective double bends.

12. A container according to any one of claims 8 to 11, wherein said base portion is comprised of stiffening corrugations (26) which are substantially vertical.

13. A container according to claim 12, wherein said stiffening corrugations (26) of said base portion merge into at least one of said stiffening corrugations (21) of said intermediate portion.

14. A container according to any one of claims 8 to 13, wherein said corrugations (21, 26) shallow as they approach a substantially vertical peripheral weld (2) of said container (1).

15. A container according to any one of claims 1 to 13, and further comprising a substantially vertical peripheral weld (2) of said container (1), a stretch (14) of said weld (2) being removable from the outer end of said neck (9) to form a pouring opening (11), an imaginary upward extension (14b) of a stretch (14a) of said weld (2) from said opposite side to said neck (9) being substantially tangential to the mid-portion of a pouring edge of said opening (11).

16. A container according to any one of claims 1 to 7, wherein said intermediate portion includes protrusions (5-8) in the form of islands (5-8) distributed over said intermediate portion and serving to stiffen said intermediate portion.

17. A container according to claim 16, wherein said protrusions (5-8) project inwardly of said container (1).

18. A container according to claim 16, or 17, wherein said islands (5-7) are arranged in columns with substantially vertical gaps (35) among the columns.

19. A container according to claim 16, or 17, wherein said islands (5-8) comprise a pair of columns of three islands (5) each of a substantially circular profile, between which is positioned a vertically elongate island (6) above which is a further substantially circular island (7) and an upper horizontally elongate island (8).

20. A container according to any preceding claim, wherein said closure (15) takes the form of a plug (15) formed of two parts of sheet material (42) welded together so as to form an open recess (40) in an outer end of said plug (15).

21. A container according to any preceding claim, wherein said neck (9) has a longitudinal axis inclined upwardly and outwardly towards said one side.

22. A container according to any preceding claim, wherein at respective lowermost zones of laterally external surfaces of said container (1), there are recesses (5a) with arched profiles.

23. A container including a wall formed with a pear-shaped opening (11), and a closure (15) insertable into said opening (11) for closing the same, said closure (15) including an annular sealing surface of a pear shape to close said opening (11) sealingly.

24. A container moulded from plastics sheet material and comprised of a top portion, a base portion and an annular intermediate portion interconnecting said top portion and said base portion, said intermediate portion being comprised of stiffening corrugations (21) obliquely inclined to the horizontal.

25. A container according to claim 24, wherein said stiffening corrugations (21) comprise respective central stretches (22) which are substantially horizontal.

26. A container according to claim 25, wherein each of said stiffening corrugations (21) includes opposite end stretches (23) which are directed oppositely away from each other.

27. A container according to claim 26, wherein said end stretches (23) of each corrugation (21) include respective double bends.



28. A container according to any one of claims 24 to 27, wherein said base portion is comprised of stiffening corrugations which are substantially vertical.

29. A container according to claim 28, wherein said stiffening corrugations (26) of said base portion merge into at least one of said stiffening corrugations (21) of said intermediate portion.

30. A container according to any one of claims 24 to 29, wherein said corrugations (21, 26) shallow as they approach a substantially vertical peripheral weld (2) of said container (1).

31. Apparatus for moulding a container from plastics sheet material, comprising a mould (30) having a recess (33) having a first wall portion, a second wall portion and a third wall portion intermediate said first wall portion and said second wall portion, and serving to shape a top portion, a base portion and an intermediate portion, respectively, of said container (1), said third wall portion being comprised of corrugations (34) obliquely inclined to a plane (T) tangential to those parts of said second wall portion further from said third wall portion.

32. Apparatus according to claim 31, wherein said corrugations (34) comprise respective central stretches which are substantially parallel to said plane (T).

33. Apparatus according to claim 32, wherein each of said corrugations (34) includes opposite end stretches which are directed oppositely away from each other.

34. Apparatus according to claim 33, wherein said end stretches of each corrugation (34) include respective double bends.

35. Apparatus according to any one of claims 31 to 34, wherein said second wall portion is comprised of corrugations which are substantially perpendicular to said plane (T).

36. Apparatus according to claim 35, wherein said corrugations of said second wall portion merge into at least one of said corrugations (34) of said third wall portion.

37. Apparatus according to any one of claims 31 to 36, wherein said corrugations (34) shallow as they approach a separation plane of said mould.

38. A container moulded from plastics sheet material and comprised of a top portion, a base portion and an annular intermediate portion interconnecting said top portion and said base portion, said intermediate portion including protrusions (5-8) in the form of islands (5-8) distributed over said intermediate portion and serving to stiffen said intermediate portion.

39. A container according to claim 38, wherein said protrusions (5-8) project inwardly of said container (1).

40. A container according to claim 38, or 39, wherein said islands (5-7) are arranged in columns with substantially vertical gaps (35) among the columns.

41. A container according to claim 38, or 39, wherein said islands (5-8) comprise a pair of columns of three islands (5) each of a substantially circular profile, between which is positioned a vertically elongate island (6) above which is a further substantially circular island and an upper horizontally elongate island (8).

42. A method of cleaning a container moulded from plastics sheet material and comprised of a top portion, a base portion and an annular intermediate portion interconnecting said top portion and said base portion, said intermediate portion including protrusions (5-7) in the form of islands (5-7) distributed over said intermediate portion and serving to stiffen said intermediate portion, said method comprising injecting downwardly through said top portion a gaseous cleaning fluid, said fluid travelling down to said base portion, and thereupon returning to said top portion via substantially rectilinear routes (35) among said islands (5-7).

43. A method of producing a container, comprising heating a plastics web (42) to a temperature at which said web (42) is formable, moulding a larger part of said plastics web (42) to form a body portion (3) for said container (1) and a smaller part of said web (42) to form a closure (15) for said container (1), said moulding of said larger part

being performed within larger internal surface portions of a mould (30) and the moulding of said smaller part being performed within smaller internal surface portions of said mould (30) at least one (38) of which is displaced relatively to substantially all of the other internal surface portions of the mould (30) during the moulding of said closure (15).

44. A method according to claim 43, wherein said heating includes heating a second plastics web (42) to said temperature, said moulding including blow-moulding said larger part and a larger part of said second plastics web (42) within said larger internal surface portions to form said body portion (3) and mechanically moulding said smaller part and a smaller part of said second web (2) within said smaller internal surface portions to form said closure (15).

45. A method according to claim 44, wherein compressed gaseous fluid is supplied from a source thereof to perform directly said blow-moulding and from said source to perform indirectly said mechanical moulding.

46. A method according to claim 45, wherein compressed gaseous fluid from said source is supplied directly to said at least one (38) of said smaller internal surface portions to cool the same and said smaller part(s) during said mechanical moulding.

47. Apparatus for use in producing a container, comprising heating and moulding means (30) for heating a plastics web (42) to a temperature at which said web (42) is formable and moulding a larger part of said plastics web (42) to form a body portion (3) for said container (1) and a smaller part of said web (42) to form a closure (15) for said container (1), said heating and moulding means (30) comprising a mould (30) having larger internal surface portions for moulding said larger part and smaller internal surface portions for moulding said smaller part, and first driving means which serves to displace at least one of said larger internal surface portions, and second driving means (36, 37) which serves to displace at least one (38) of said smaller surface portions relatively to substantially all of the other internal surface portions of the mould (30).

48. Apparatus according to claim 47, wherein said second driving means (36, 37) comprises a piston-cylinder device (36, 37) and said at least one (38) of said smaller surface portions comprises a head of a

plunger (38), which head is displaceable through a separation plane (P) of said mould (30).

49. Apparatus according to claim 48 and further comprising ducting extending from said piston-and-cylinder device (36, 37) to the exterior of said head for leading gaseous driving fluid from said device (36, 37) to said head for cooling said head.

1/8

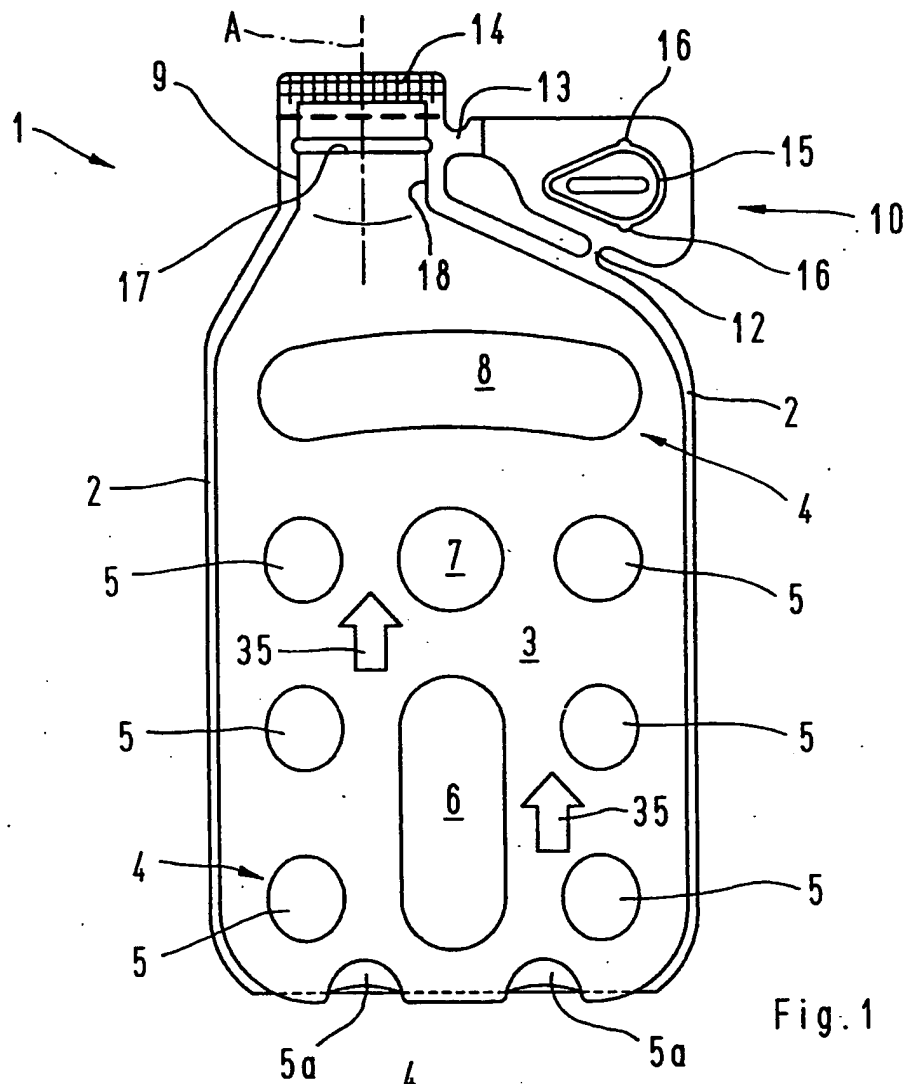


Fig. 1

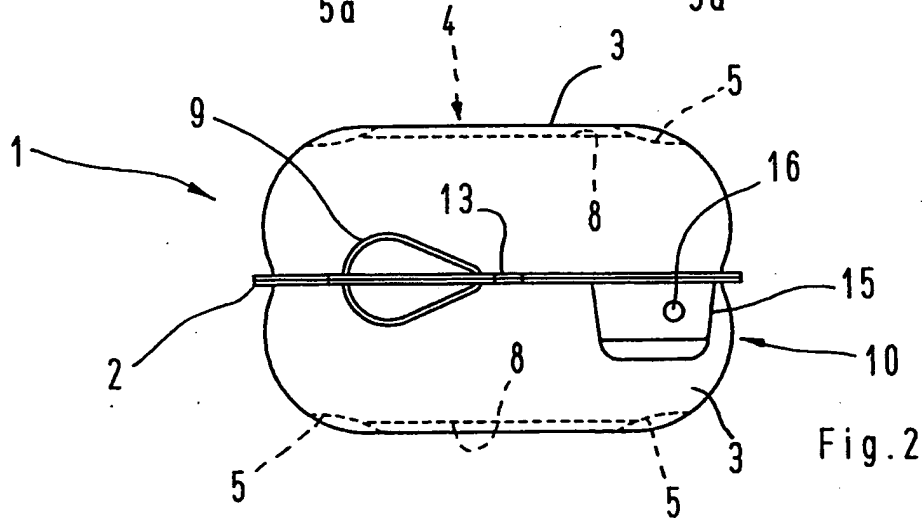
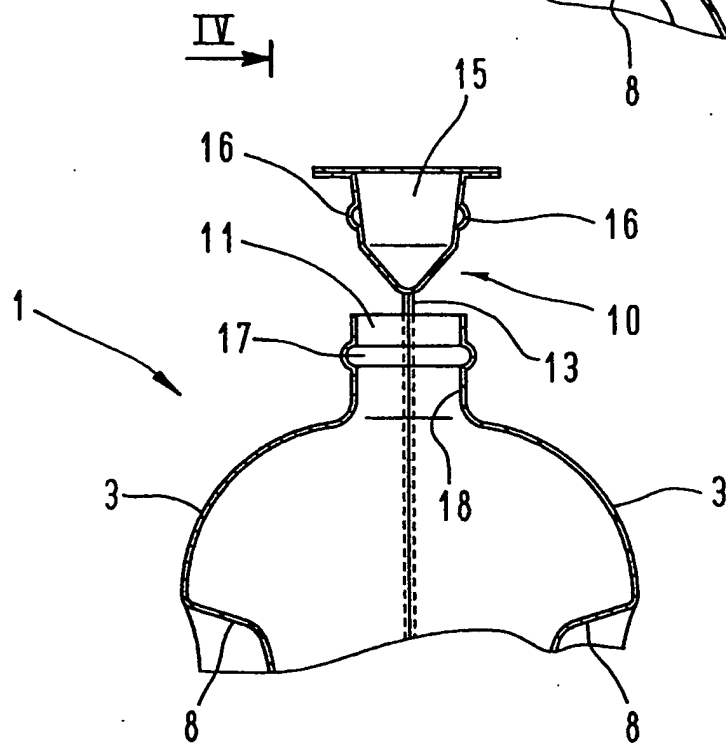
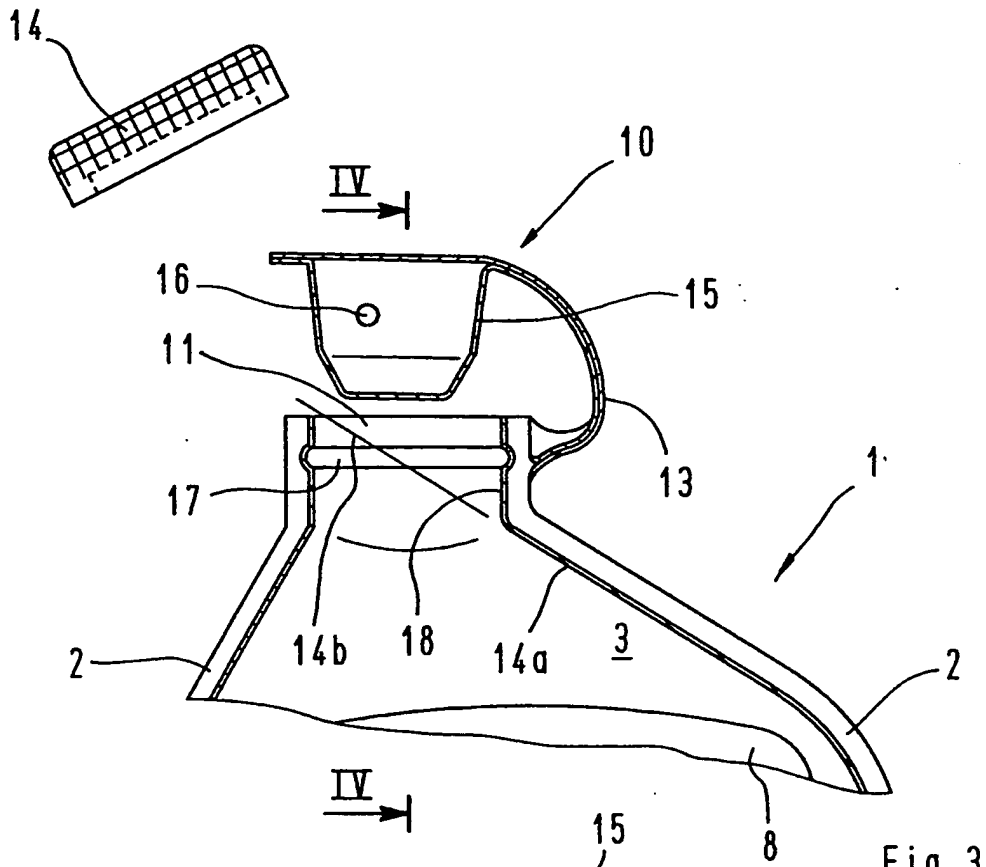
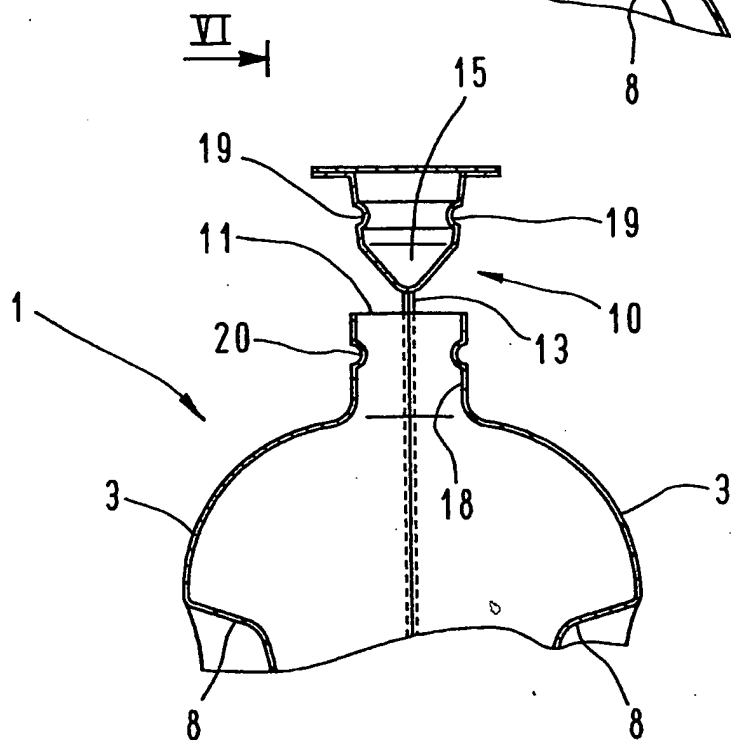
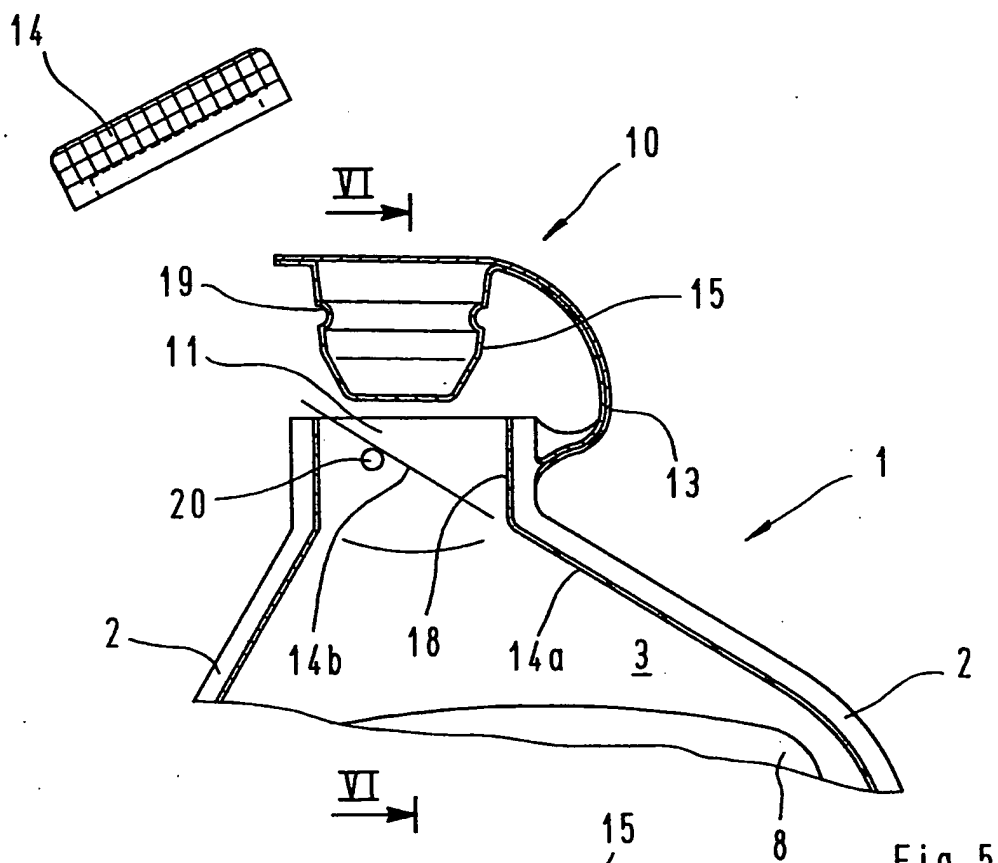


Fig. 2

2/8



3/8



4/8

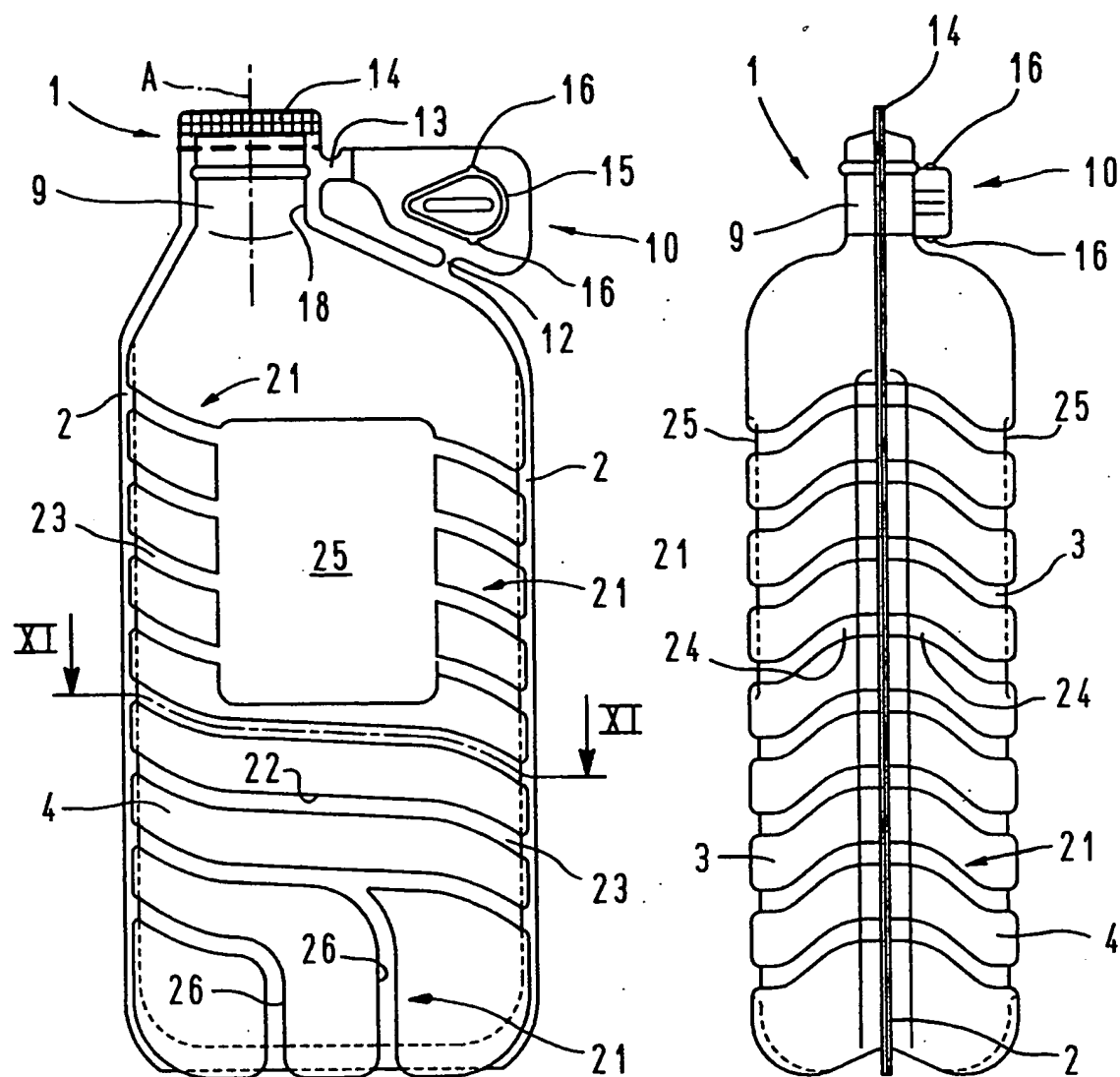


Fig. 7

Fig. 8

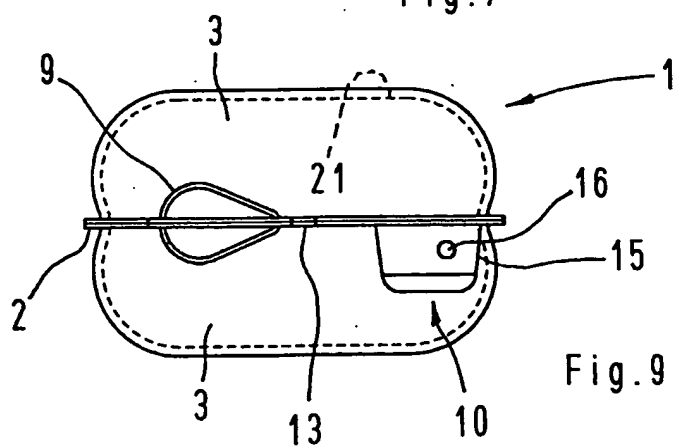
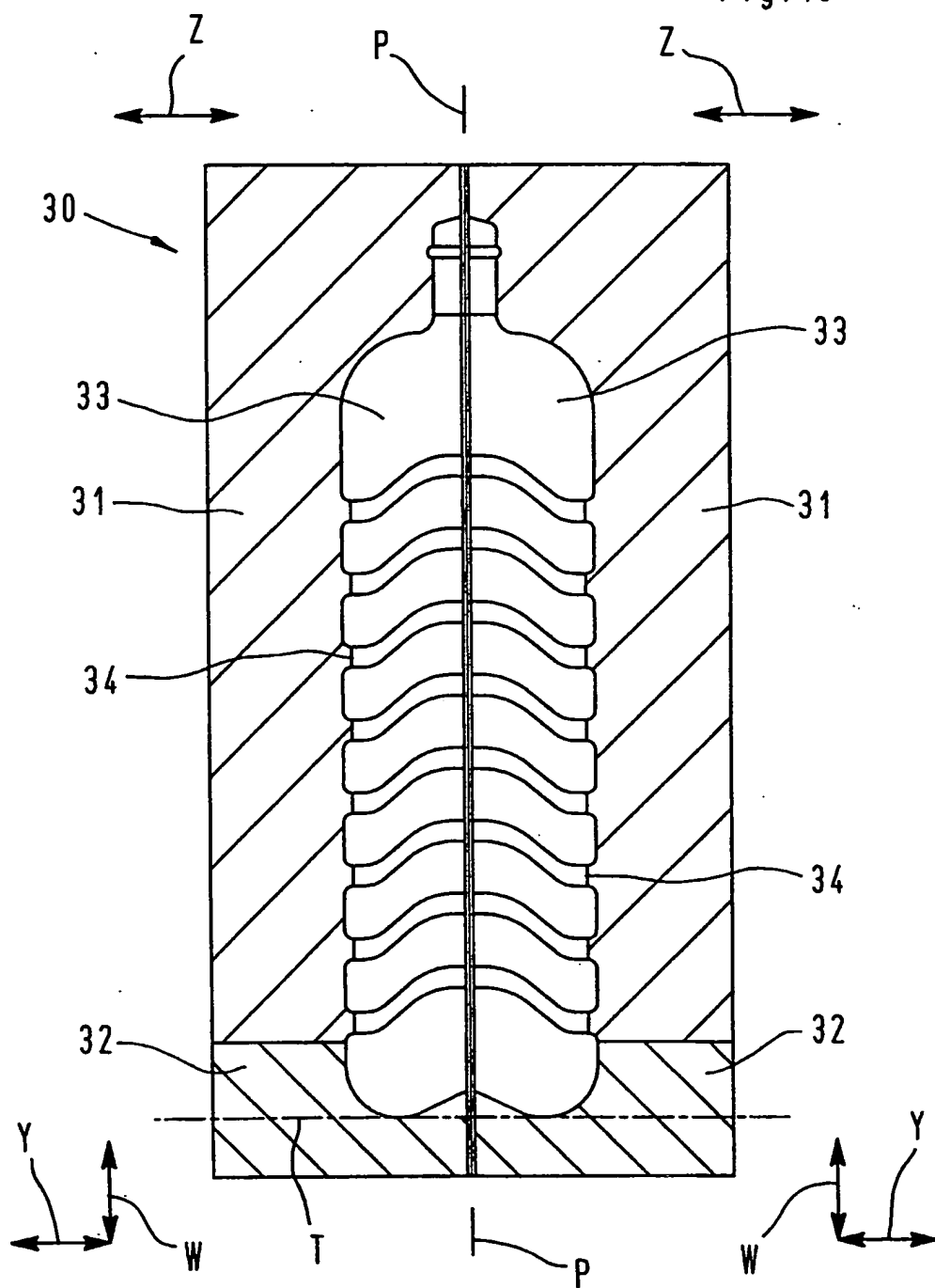


Fig. 9



5/8

Fig.10



6/8

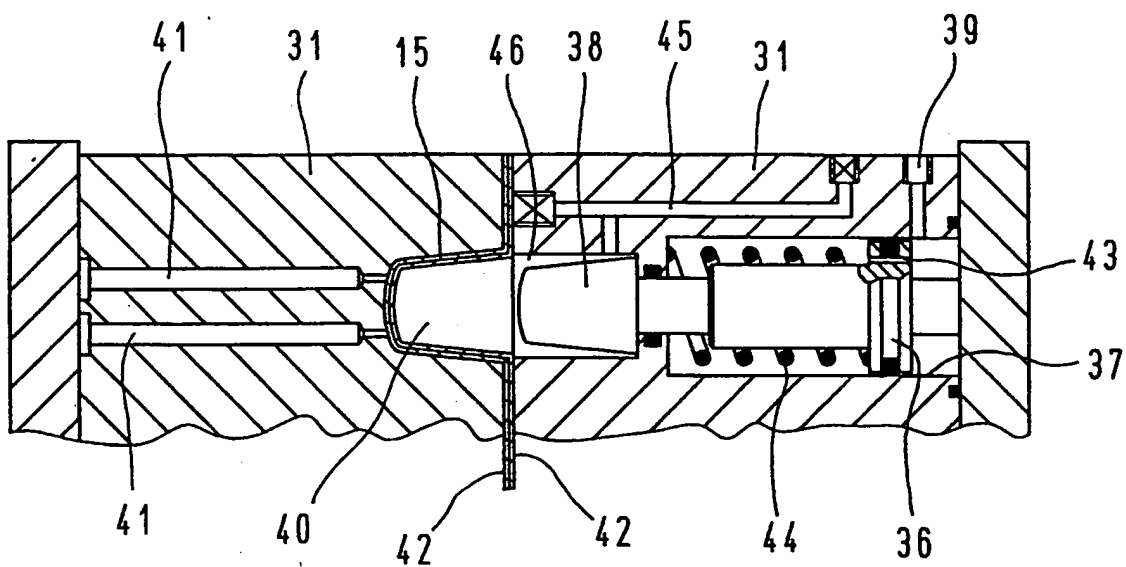
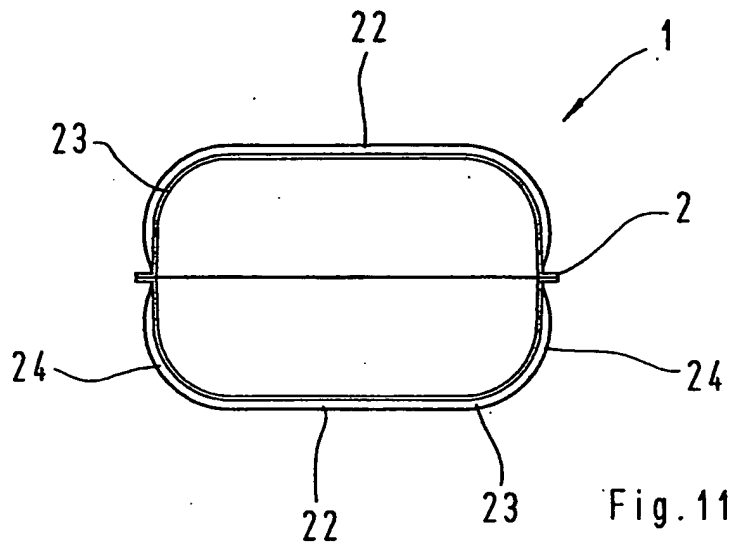


Fig. 15

7/8

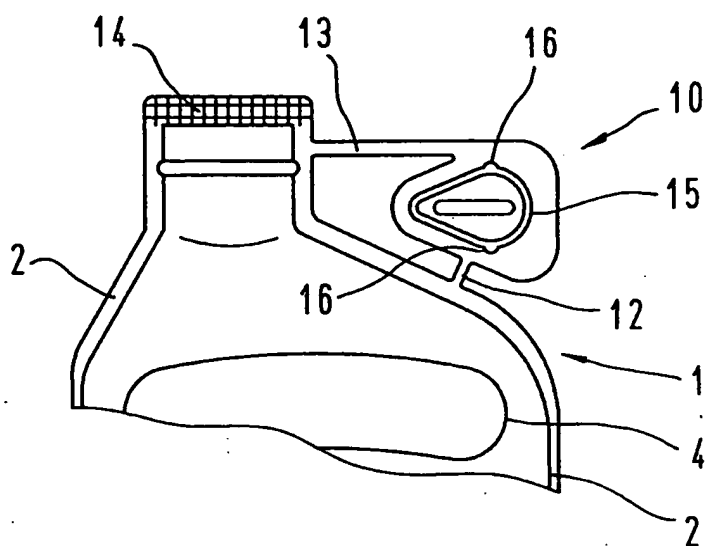


Fig. 13

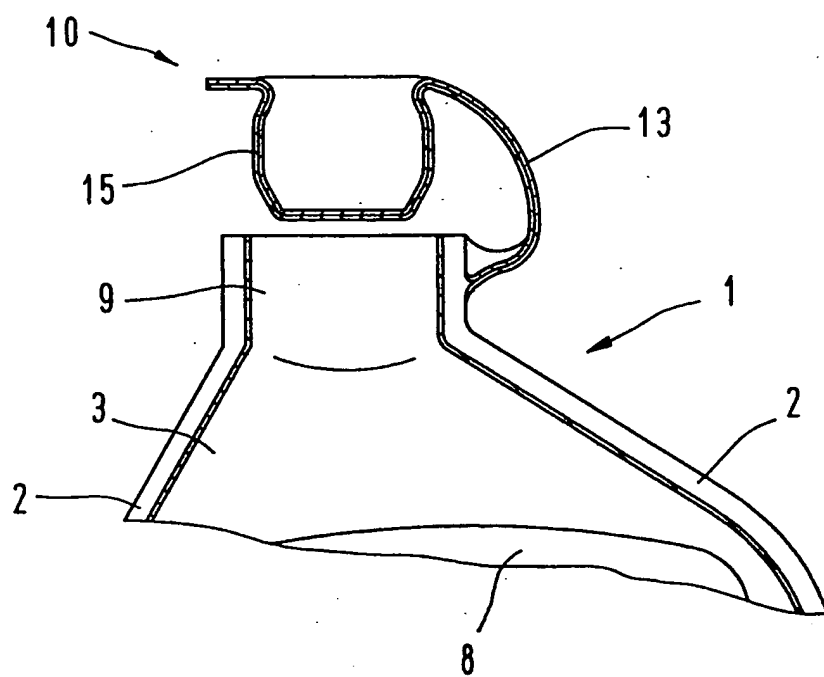
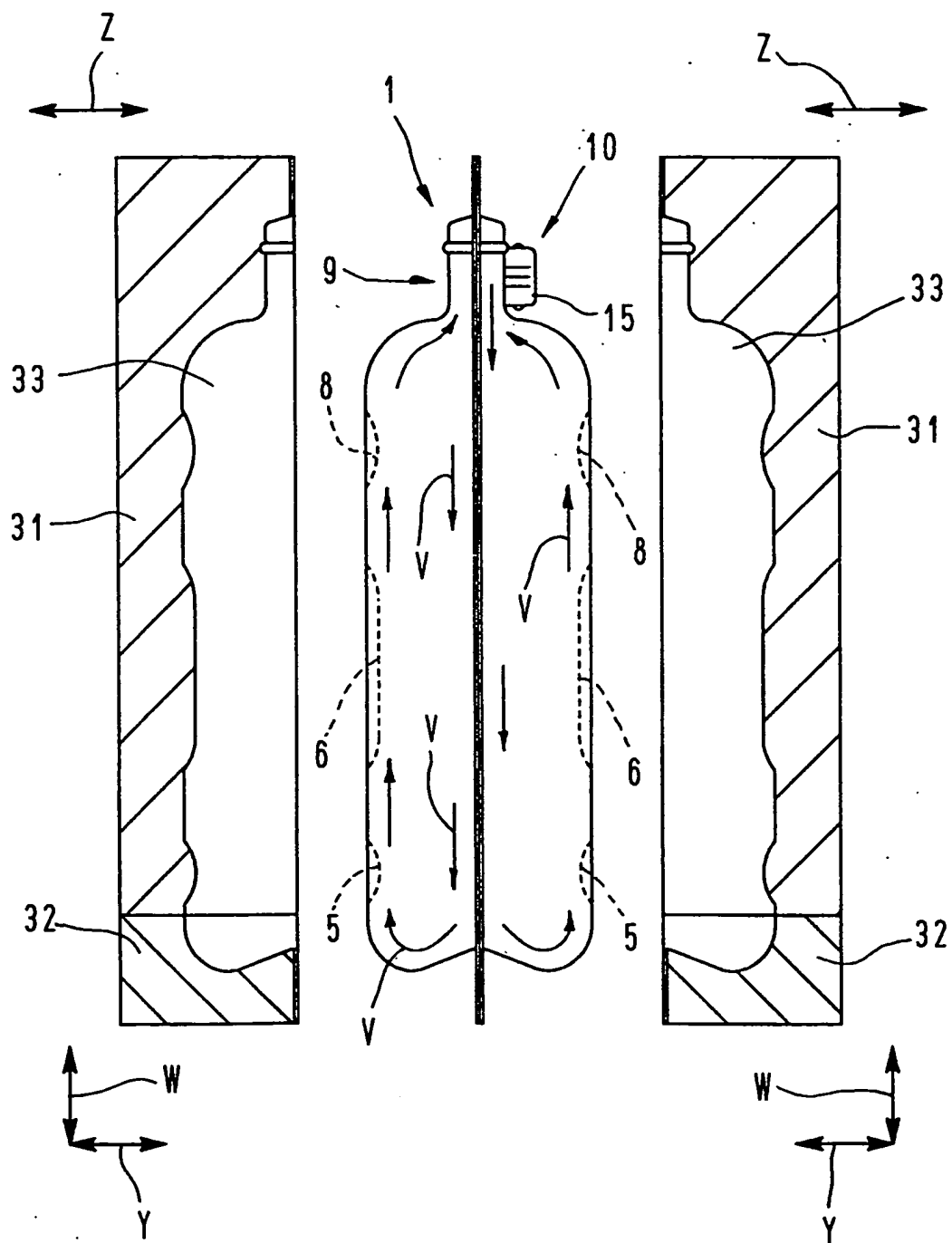


Fig. 12

Fig. 14



**This Page is Inserted by IFW Indexing and Scanning  
Operations and is not part of the Official Record**

**BEST AVAILABLE IMAGES**

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ BLACK BORDERS
- ☐ IMAGE CUT OFF AT TOP, BOTTOM OR SIDES
- ☐ FADED TEXT OR DRAWING
- ☐ BLURRED OR ILLEGIBLE TEXT OR DRAWING
- ☐ SKEWED/SLANTED IMAGES
- ☐ COLOR OR BLACK AND WHITE PHOTOGRAPHS
- ☐ GRAY SCALE DOCUMENTS
- ☐ LINES OR MARKS ON ORIGINAL DOCUMENT
- ☒ REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY
- ☐ OTHER: \_\_\_\_\_

**IMAGES ARE BEST AVAILABLE COPY.**

**As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.**